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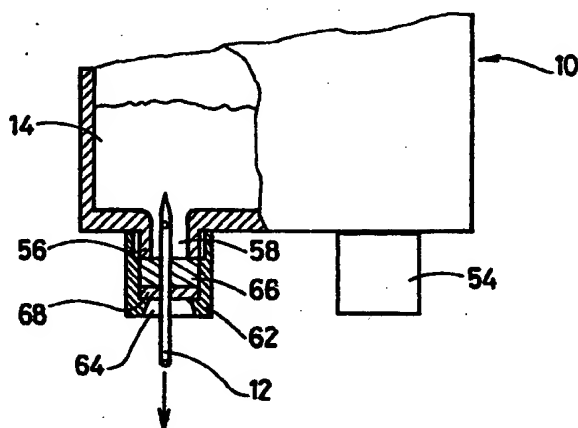
(71) Applicant: SHARP KABUSHIKI KAISHA,
22-22 Nagaike-cho Abeno-ku, Osaka 545 (JP)(43) Date of publication of application: 05.09.84
Bulletin 84/36(72) Inventor: Kuranishi, Masaaki, 26-4 Yatayama-cho,
Yamatokoriyama-shi Nara-ken (JP)
Inventor: Alba, Masahiko, 231-20 Minaminagai-cho Ko,
Nara-shi Nara-ken (JP)

(84) Designated Contracting States: DE GB IT

(74) Representative: Wright, Peter David John et al, R.G.C.
Jenkins & Co. 12-15, Fetter Lane, London EC4A 1PL (GB)

(54) Ink cartridge in an ink jet system printer.

(57) An ink liquid supply system for an ink jet system printer includes an ink intake needle (12) formed in a body of the ink liquid supply system, and an ink cartridge (10) removably mounted on the body of the ink liquid supply system. The ink cartridge includes an opening (64) covered by a seal rubber (66) through which the ink intake needle is inserted when the ink cartridge is mounted on the body of the ink liquid supply system. An ink liquid absorbing pad (68) is attached to the seal rubber so as to cover the seal rubber. The ink liquid absorbing pad functions to prevent the ink liquid from dropping onto the body of the ink liquid supply system when the ink cartridge is demounted from the body of the ink liquid supply system.



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INK CARTRIDGE IN AN INK JET SYSTEM PRINTERBACKGROUND OF THE INVENTION

[FIELD OF THE INVENTION]

The present invention relates to an ink cartridge for use in
5 an ink liquid supply system of an ink jet system printer.

[DESCRIPTION OF THE PRIOR ART]

Generally, an ink cartridge is employed in an ink liquid supply
10 system for an ink jet system printer. The ink liquid supply system includes a standing needle which is inserted into a seal member formed in the ink cartridge when the ink cartridge is attached to the ink liquid supply system.

At a time when the ink cartridge is demounted from the ink liquid supply system while the ink liquid is still contained in the ink cartridge, there is a possibility that the ink liquid drops through the hole formed by the standing needle in the seal member. The ink liquid dropped from the ink cartridge may damage the insulation of the ink jet system printer. A preferred seal rubber to prevent the above-mentioned ink liquid dropping has not yet been found.

OBJECTS AND SUMMARY OF THE INVENTION

Accordingly, an object of the present invention is to provide an ink cartridge in an ink liquid supply system, which ensures a stable operation of an ink jet system printer.

5 Another object of the present invention is to provide an ink cartridge which does not drop ink liquid even though the ink cartridge is demounted from an ink liquid supply system under the condition where ink liquid is still contained in the ink cartridge.

10 Other objects and further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. It should be understood, however, that the detailed description and specific examples, while indicating preferred embodiments of the invention, are
15 given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

20 To achieve the above objects, pursuant to an embodiment of the present invention, an ink cartridge includes an opening to which a standing needle formed in an ink liquid supply

system is inserted when the ink cartridge is secured to the ink liquid supply system. The opening is sealed by a rubber seal through which the standing needle is inserted. An ink liquid absorbing sheet is attached to the rubber seal at the outer surface thereof in order to absorb ink liquid dropped through a hole formed by the standing needle.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be better understood from the detailed description given hereinbelow and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention and wherein:

FIGURE 1 is a block diagram of an ink liquid supply system in an ink jet system printer of the charge amplitude controlling type, which includes an embodiment of an ink cartridge of the present invention;

FIGURE 2 is a perspective view of an embodiment of an ink cartridge of the present invention;

FIGURE 3 is a partially sectional view of an essential part of the ink cartridge of FIGURE 2, showing a condition where

the ink cartridge is secured to the ink liquid supply system;
and

FIGURE 4 is a perspective view of a cap portion included in
the ink cartridge of FIGURE 2.

5

DESCRIPTION OF THE PREFERRED EMBODIMENTS

10

15

An ink liquid supply system for an ink jet system printer of
the charge amplitude controlling type includes an ink car-
tridge 10 removably secured to the ink liquid supply system.
More specifically, the ink liquid supply system includes an
ink intake needle 12 for introducing ink liquid 14 from the
ink cartridge 10 into an ink supply conduit 16, and an ink
discharge needle 18 for discharging the ink liquid toward
the ink cartridge 10. The ink intake needle 12 and the ink
discharge needle 18 are inserted into seal portions of the
ink cartridge 10 when the ink cartridge 10 is secured to the
ink liquid supply system.

20

An example of the ink liquid supply system of the above-
mentioned type is disclosed in copending application Ser. No.
512,639 "BUBBLE REMOVAL IN AN INK LIQUID SUPPLY SYSTEM OF AN
INK JET SYSTEM PRINTER" filed on July 11, 1983 by Masahiko

AIBA and Naohiro OKU, and assigned to the same assignee as the present application. The Japanese counterpart was filed on July 31, 1982 and assigned application number P 57-134010. The British counterpart is 8320190 filed on July 27, 1983. 5 The German counterpart is P 33 26 717.0 filed on July 25, 1983. The Canadian counterpart was filed on July 13, 1983 and assigned Ser. No. 432,323.

The ink liquid introduced from the ink cartridge 10 is supplied to a subtank 20 via the ink supply conduit 16. A constant flow rate pump system 22 is connected to introduce the ink liquid from the subtank 20 via an ink inlet valve 24. 10 The constant flow rate pump system 22 develops the ink liquid of a constant flow rate toward an accumulator 26 through an ink outlet valve 28. The accumulator 26 functions to 15 stabilize the static pressure of the ink liquid developed from the constant flow rate pump system 22.

The thus stabilized ink liquid is supplied from the accumulator 26 to a printer head 30 via an electromagnetic cross valve 32. As is well known in the art, the printer head 30 20 includes a nozzle to which an electromechanical transducer (piezo vibrator) is attached in order to emit ink droplets at a given frequency. The printer head 30 further includes a charging tunnel for charging the ink droplets in accordance

with a print information signal. The charged ink droplets are deflected while they pass between a pair of deflection electrodes which are also included in the printer head 30. The ink droplets not contributing to the actual printing operation are not charged nor deflected, and are directed to a beam gutter 34. The ink liquid collected by the beam gutter 34 is returned to the ink cartridge 10 via a returning conduit 36. The ink liquid introduced into the returning conduit 36 is fed to the ink discharge needle 18 by means of a suction pump 38. Valves 40 and 42 are associated with the suction pump 38 to ensure the ink liquid returning operation.

The ink cartridge 10 of the present invention is provided with a cylinder shaped projecting opening 44 formed in the upper surface thereof. The outer periphery of the projecting opening 44 is provided with a thread portion to which a cap 46 is engaged. The cap 46 is demounted from the projecting opening 44 when new ink liquid is introduced into the ink cartridge 10. The cap 46 includes handling ribs 48, and flat plate portions 50 which ensures tight connection between the cap 46 and the upper surface of the ink cartridge 10. When the ink jet system printer is placed in an operating condition, the cap 46 is slightly loosened so as to maintain the ink liquid 14 contained in the ink cartridge 10 at the atmospheric pressure.

Communication/seal portions 52 and 54 are formed on the bottom wall of the ink cartridge 10 through which the ink intake needle 12 and the ink discharge needle 54 are inserted, respectively. The communication/seal portions 52 and 54
5 have the same construction with each other.

The communication/seal portion 52 (54) includes a cylinder shaped projection 56 which has an ink liquid passage 58 formed through the center of the cylinder shaped projection 56. A thread portion 60 is formed on the outer periphery of
10 cylinder shaped projection 56. A seal cap 62 has a thread portion formed on the inner cylindrical surface thereof, the thread portion being engaged with the thread portion 60 of the cylinder shaped projection 56. The seal cap 62 is provided with a communication opening 64 which is formed at the
15 center of the bottom wall of the seal cap 62. A seal rubber 66 for sealing the ink liquid passage 58 formed in the cylinder shaped projection 56, and an ink liquid absorbing pad 68 made of sponge are disposed between the cylinder shaped projection 56 and the seal cap 62.

20 When the thus constructed ink cartridge 10 is secured to the ink liquid supply system, the ink intake needle 12 is inserted through the ink liquid absorbing pad 68 and the seal rubber 66 via the communication opening 64. The tip end of

the ink intake needle 12 reaches the ink liquid 14 disposed in the ink cartridge 10 so as to intake the ink liquid 14 from the ink cartridge 10 into the ink liquid supply system. In a same manner, the ink discharge needle 18 is inserted
5 through the ink liquid absorbing pad 68 and the seal rubber 66 so that the ink liquid developed from the suction pump 38 is introduced into the ink cartridge 10.

When desired, the ink cartridge 10 is demounted from the ink liquid supply system. At this moment, the seal rubber 66
10 and the ink liquid absorbing pad 68 are removed from the ink intake needle 12 (ink discharge needle 18). If the ink liquid 14 remains in the ink cartridge 10, the ink liquid may flow through a hole formed by the ink intake needle 12 (ink discharge needle 18) in the seal rubber 66. However, the
15 thus leaked ink liquid is absorbed by the ink liquid absorbing pad 68, thereby preventing the ink liquid from dropping onto the ink jet system printer. Furthermore, the ink liquid absorbing pad 68 functions to wipe off ink liquid attached to the ink intake needle 12 and the ink discharge
20 needle 18 when the ink cartridge 10 is demounted from the ink liquid supply system.

The invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are

not to be regarded as a departure from the spirit and scope of the invention. There are described above novel features which the skilled man will appreciate give rise to advantages. These are each independent aspects of the invention to be covered by the present application, irrespective of whether they are included within the scope of the following claims.

CLAIMS:

1 1. In an ink liquid supply system for an ink jet system
2 printer including an ink cartridge removably secured to
3 a body of the ink liquid supply system, and an ink in-
4 take needle formed in said body of the ink liquid supply
5 system for introducing ink liquid from said ink car-
6 tridge into said body of the ink liquid supply system,
7 said ink cartridge comprising:

8 a bottom wall provided with an opening formed at a
9 position corresponding to said ink intake needle;
10 a seal member disposed at said opening so as to
11 seal said opening; and

12 an ink liquid absorbing member disposed at said
13 opening so as to cover said seal member,

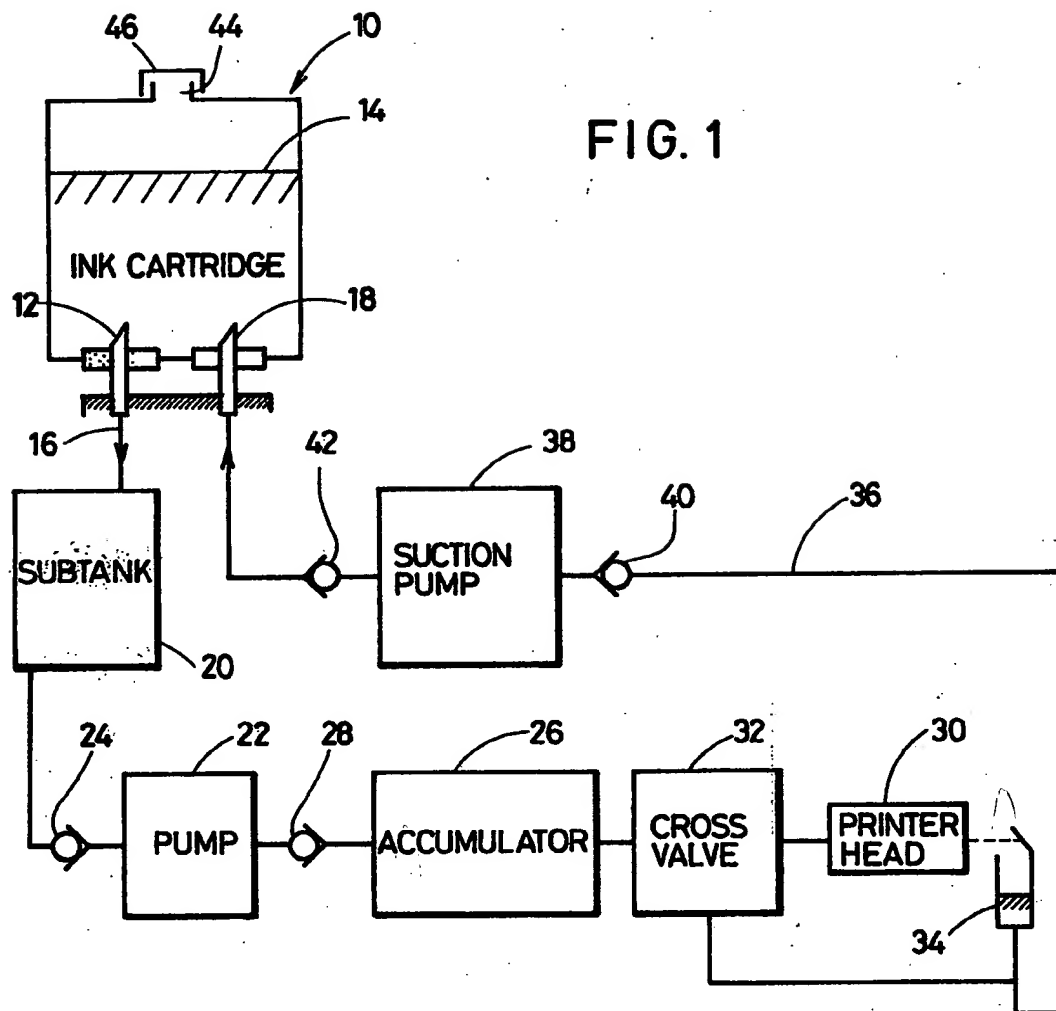
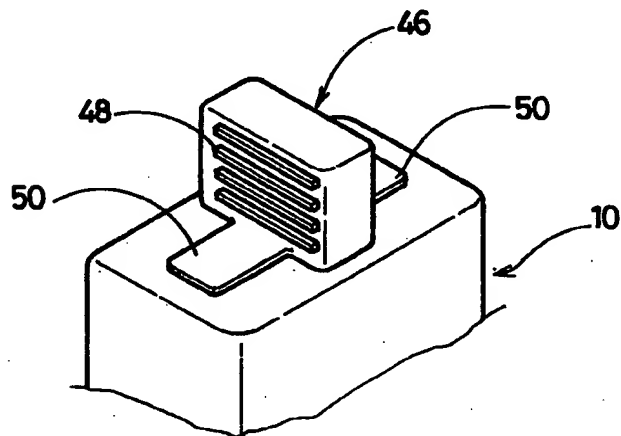
14 wherein said ink intake needle is inserted through said
15 ink liquid absorbing member and said seal member when
16 the ink cartridge is mounted on the body of the ink
17 liquid supply system.

1 2. The ink liquid supply system of claim 1, wherein said
2 body of the ink liquid supply system includes a subtank
3 communicated with said ink intake needle.

1 3. The ink liquid supply system of claim 1, further com-
2 prising:
3 a cylinder shaped projection fixed to said bottom
4 wall of said ink cartridge at the position cor-
5 responding to said opening, said cylinder shaped
6 projection being provided with an ink liquid pas-
7 sage formed through the center of said cylinder
8 shaped projection, said ink liquid passage being
9 communicated with said opening; and
10 a cap member capping said cylinder shaped projec-
11 tion with the intervention of said seal member and
12 said ink liquid absorbing member, said cap member
13 being provided with an aperture formed at the
14 position corresponding to said ink liquid passage
15 formed in said cylinder shaped projection.

1 4. The ink liquid supply system of claim 3, wherein said
2 cylinder shaped projection includes a thread portion
3 formed on the outer periphery of said cylinder shaped
4 projection, and said cap member includes a thread por-
5 tion formed on the inner surface of said cap member so
6 that said cap member is secured to said cylinder shaped
7 projection by engaging said thread portions to each
8 other.

5. An ink liquid supply system for an ink jet printer, comprising a removable ink cartridge having a portion penetrable by an ink-conducting needle forming part of the system, and an ink liquid absorbing member
5 associated with said penetrable portion for preventing formation of free ink drips when the cartridge is removed and hence the needle is withdrawn.
6. A liquid ink cartridge as referred to in any one of
10 claims 1 to 5 and adapted for use in a system as claimed therein.

**FIG. 4**

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FIG. 2

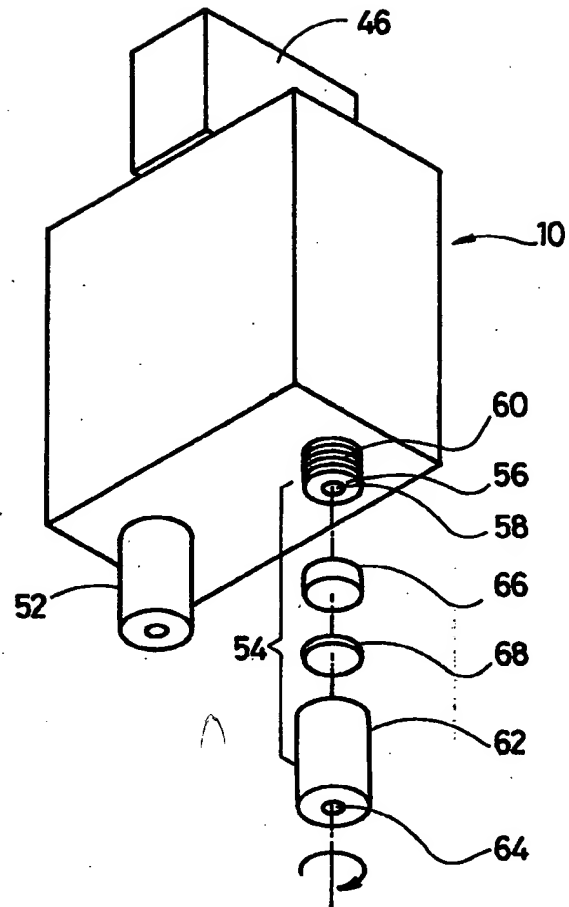


FIG. 3

